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ILHAIRE Laughter Database

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Abstract

The ILHAIRE project seeks to scientifically analyse laughter in sufficient detail to allow the modelling of human laughter and subsequent generation and synthesis of laughter in avatars suitable for human machine interaction. As part of the process an incremental database is required providing different types of data to aid in modelling and synthesis. Here we present an initial part of that database in which laughs were extracted from a number of pre-existing databases. Emphasis has been placed on extraction of laughs that are social and conversational in style as there are already existing databases that include instances of hilarious laughter.

Keywords: Laughter, Database, Social

1. Introduction

The ILHAIRE project seeks to scientifically analyse laughter in sufficient detail to allow the modelling of human laughter and subsequent generation and synthesis of laughter in avatars suitable for human machine interaction. As part of the process an incremental database is required providing different types of data to aid in modelling and synthesis. The database is termed “incremental” as different teams within the project require different types of data and at varying stages during the life of the project. At the end of the project there will be a substantial database, which will contain laughs extracted and annotated from existing databases in addition to the generation of specific laughter material. The latter will be recorded and annotated in detail, using FACS annotation and motion capture data of both facial features and full body motion during laughter events.

The project recognises that laughter includes not only hilarious laughter but also various forms of social laughter. Hilarious laughter occurs typically in reaction to a stimulus such as a joke or a funny video. Importantly, it can occur either when the laughter is alone, or in the presence of others. Social laughter, however, only occurs during social interactions typically in conversations involving two or more participants. It is thought to serve several functions in conversations: it can regulate a conversational interaction, alter the meaning of an utterance, provide a backchannel signal that acknowledges engagement in the conversation, or signal a level of group cohesion (Vettin & Todt, 2004).

There are already existing databases dedicated to providing instances of laughter: including the AVLaughterCycle database produced by members of the ILHAIRE project, which will not be reported on here; as well as the MAHNOB laughter database (Petridis et al., In Press). These databases focus primarily on hilarious laughter. To provide a preliminary overview of laughs that are more social in nature, we have extracted laughter from five existing databases designed to show people acting and interaction in a variety of situations that are

relatively natural, but emotionally coloured. Five databases were chosen to extract these kinds of laugh. Laughter was not a criterion in the construction of any of these databases, and so there is no bias either towards the presence of laughter, or towards the presence of any particular type of laughter, in them. As this is an initial attempt to extract and social and conversational laughter multiple naturalistic databases were used with the goal of an exhaustive search extracting laughter where it was observed to occur and often in natural settings not typically associated with laughter. The database reported here contains all the extracts from these databases which did contain laughter, with associated labels. An attempt was made by one person to exhaustively extract laughter from these databases. This was followed by further validation of a subset of the extracted laughs. This paper reports only on the initially extracted laughs the validation will be reported in greater detail a future paper. It will be made available as part of the broader ILHAIRE database. The nature of data collection in each of these databases is explained in greater detail in the references associated with the original databases.

The paper will introduce each of the databases that were used in the creation of this initial phase of the ILHAIRE Laughter Database and address the issues that arise due to the idiosyncrasies of the original database. This will be followed by details of annotations that are available and future annotation plans.

2. Belfast Naturalistic Database

The Belfast Naturalistic Database (Douglas-Cowie, Campbell, Cowie, & Roach, 2003) was an early attempt to gather a broad swathe of audio-visual material of people who at least appeared to be experiencing genuine emotion. These were primarily drawn from television programmes, talk shows, religious and factual programmes. The material contains a broad sample of both negative and positive emotions, with 53 of the total of 127 video clips containing laughter in some form. There are copyright issues associated with many of the video clips in the Belfast Naturalistic Database which unfortunately means that only five of the clips can be

broadly disseminated with the ILHAIRE Laughter Database.

3. HUMAINE Database

The HUMAINE database (Douglas-Cowie et al., 2007) was created with the purpose of demonstrating the breadth of material that exists related to a broad understanding of the word emotion—termed ‘pervasive emotion’. The database contains fifty audio-visual clips from a variety of sources providing diverse examples of emotional content relevant to affective computing. From these fifty clips 46 instances of laughter were extracted for inclusion in the current database. The quality of these clips is variable, but they are useful as illustrations of the variety of situations in which laughter occurs.

4. Green Persuasive Database

The Green Persuasive Database (Douglas-Cowie et al., 2007) contains a collection of audiovisual clips that were recorded to capture a type of interaction where there are strong feelings, but not basic emotions. The scenario involves one participant who is trying to convince the other participant of the moral case for trying to adopt a more environmentally friendly lifestyle, using as examples sustainable transport, flying less, and reducing greenhouse gas emissions. The conversations are mildly confrontational but persuasive and friendly rather than overtly argumentative. There is a strong power imbalance between participants as the persuader is a University Professor and the listeners are students. There were eight interactions in total lasting between 15 and 35 minutes. From these eight participants 280 instances of laughter were extracted. The nature of the interactions meant that most of these laughs are conversational or social laughs that occur as a natural part of a social interaction between two people. Very few would be classified as hilarious laughs.

5. Belfast Induced Natural Emotion Database

The Belfast Induced Natural Emotion Database (BINED) (Sneddon, McRorie, McKeown, & Hanratty, 2012) represents a deliberate effort to induce specific kinds of emotional behavior. The goal of the database was to produce material that could act as replacements to the posed static photographs that are often used in studies of emotion. Natural dynamic emotion was elicited either by watching emotional video clips or by a series of tasks in which participants actively engaged. The database is organized into three sets based around chronological data collection periods. The first set involved tasks designed to elicit: Amusement, Disgust, Fear, Frustration, and Surprise. There are 113 participants, 43 females and 70 males in Set 1 of the database. Laughs have been extracted from this set, 289 instances of laughter were extracted from a total of 565 clips. These occurred at different frequencies depending on the kind of emotion that the task sought to elicit. Figure 1 plots the frequency of the laugh instances for males and females in these

clips for each of the different tasks. Importantly the number of clips differs and so this information serves only to display the numbers of instances of each clip in the database and not a comparison of levels of laughter in each gender. Work is ongoing to add laughs from Set 2 and Set 3 of the database. This work includes the extraction of laughs from the Amusement clips by 9 raters, and will provide a greater reliability to the laugh extraction as well as providing some knowledge about the ambiguity involved in deciding where the exact onset and offset points are in a given laugh. While laughter onset is typically the easier of these to distinguish, identifying onset can be particularly challenging when laughter is preceded by a smile; knowing how and when a smile becomes a laugh is an open question. Greater challenges are posed in identifying laughter offset, this can often be further compounded by a second bout of laughter can occurring before there is a return to a neutral face. We hope to address some of these issues with the clips from BINED.

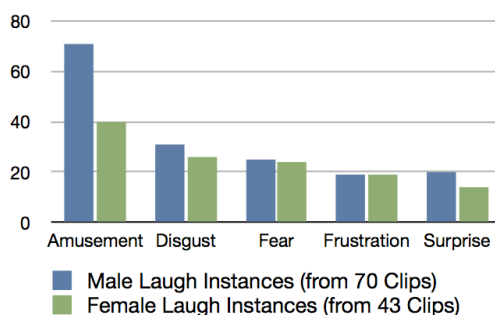


Figure 1: Laughter Instances for the task types in the BINED database

6. SEMAINE Database

The SEMAINE database (McKeown, Valstar, Cowie, Pantic, & Schröder, 2012) provides high quality audio-visual clips from a setting that is strongly aligned with the goals of the ILHAIRE project. The SEMAINE project developed a system which engages users in a sustained emotionally coloured interaction with an avatar—known as a Sensitive Artificial Listener (SAL)—with a primary emphasis on creating technology that attended to and synthesized the non-verbal components of human interaction. As part of the project there were different stages of interaction in which the various levels of engagement approached the end goal of a human machine interaction. In the initial stage known as Solid SAL one participant took the role of the user and another took the role of the avatar and acted as one of the four SAL characters in the SAL system. A later version—Semi automatic SAL—used a human interacting with an avatar operated by another human; users could see only a schematic image of a face and the operator selected pre recorded utterances from a set script. The final stage involved interactions with an

autonomous avatar controlled by the fully automatic SAL system. Once again there was no explicit remit within the SEMAINE project that called for laughter in the interactions, the laughter that occurred was largely conversational and social laughter incidental to the task of interacting with the avatar or with a person pretending to be an avatar. The laughs that are included in this version of the ILHAIRE database are taken from the Solid SAL interactions and therefore involve interaction between two humans. Laughs were automatically

annotated by the audio feature recognition components of the openSMILE system within the SAL system and then extracted using this annotation. While these laughs were checked by a human and some false positives were removed, it is possible that some laughs that were not recognized by the system and, therefore, the list cannot be considered an exhaustive extraction of the laughs in the Solid SAL section of the SEMAINE database. In total 443 instances of laughter were extracted from 345 video clips.

Expressing predominantly positive emotions		Mean Rating Frequency
Happy	Indicative of pleasure, contentment or joy because of a particular thing	16.3
Relieved	Laughter that signifies a concern or anxiety has been laid to rest	5.9
Thankful	Appreciative or expressing gratitude to a person	5.1
Hilarious	Unrestrained response to something that is simply found extremely funny	7.2
Giggling	Happy mixed with a sense that something is ridiculous or unimportant	13.8
Helpless	Laughter that is positive, but that the person has completely lost control of	4.9
Lustful	Salacious: expresses sexual arousal and anticipation	0.1
Mischievous	Playful but with the intent to cause trouble	2.4
Boastful	Laughing out of self-admiration or excessive pride	3.1
Expressing predominantly negative emotions		
Angry	Laughter that conveys aggression or intimidation	0.3
Sarcastic	Laughter to convey that words spoken should be taken as cynical or mocking	1.4
Contemptuous	A laugh that expresses superiority to the person being laughed at, showing disdain or scorn towards them	1.0
Sullen	Laughter that indicates someone is being pressurised to behave in ways that he/she resents	1.4
Tense	Uncomfortable laughter. Used in situations where it is unsure what should be said	6.4
Embarrassed	A result of being self-conscious or an expression of confusion or shame	9.1
Hysterical	Laughter that the person has completely lost control of as a result of feeling that he/she has lost control of events.	1.7
Desperate	Frenzied laughter conveying a dire need for something	1.2
Sad	Laughter indicating regret that something has happened, with resignation that it cannot be changed	2.8
Expressing emotions with positive and negative elements		
Shy	Nervous and quiet, trying not to make feelings too obvious	4.2
Anxious	Experiencing unease and trying to lessen it with laughter	10.9
Apologetic	Awkward laugh used when an individual is trying to express an apology / show remorse.	1.5
Meaningful	A laugh to show there is more meaning to what has been said than is simply expressed	3.6
Cunning	Laughter that is shrewd, sly or deceitful	0.4
Taunting	Laughter directed at someone in particular. Intended to make fun of or belittle him/her.	1.8
Schadenfreude	Laughter expressing pleasure in the misfortune of another person	1.8
Other - not primarily expressing emotions		
Physical reflex	Response to physical prompt (usually tickling)	0.4
Surprised	A reaction to astonishment, when something happens suddenly or unexpectedly	8.4
Backchannelling laughter	Laughter that is part of a conversation, and conveys a routine acknowledgement of what the other speaker has just said	8.3
Polite laughter	Laughter aimed at being courteous and showing good manners	7.9
Contrived	A forced or planned laugh	5.2
Staged laughter	Completely forced. Usually detectable easily. The kind of laugh found in TV/films	0.9
Other	Not included in the list above	2.0

Table 1. Classification Scheme for Annotation of Laughter

7. Annotation

There are existing annotations that are provided with the databases, which were collected for their original uses. These give mainly information about emotional content. To these ongoing projects are adding annotations of the laughter in the databases. Here we will comment only on the laughter-specific annotations. The attempt to annotate the onset and offset of amused clips in the Belfast Induced Natural Emotion Database has already been outlined. Additional to the goal of establishing inter-rater agreement of onset and offset times this data can be used to establish duration of laughter, and raters have also been asked to produce a rating of the intensity of laughter on a scale between 1 and 10.

A second associated project has attempted to classify the types of laughter using the clips found in the Belfast Naturalistic Database and HUMAINE database. Starting with an initial classification of 23 laughter types (Drack & Ruch, 2007) this was extended to the laughter classification scheme that can be seen in Table 1. The descriptions in each category were developed in conjunction with users to ensure that they could be readily understood by non-experts. 16 raters have classified the clips using these categories. The final column in the table shows the average number of times each label was used per rater, and so it gives a broad indication of the frequency with which different kinds of laughter appear in a pre-existing body of naturalistic material. This is not conclusive, but it gives a first indication of the kinds of laughter that should be a priority for research concerned with facilitating interaction.

The broader annotation strategy of the database is a yet undetermined. Where available resources are used for annotation will be decided depending on the outcome of the preliminary annotation research such as that outlined in Table 1, and the general requirements of the members of the ILHAIRE project.

8. Future Development

The database detailed in this paper has been developed as an initial phase in an incremental database which is being created as part of the ILHAIRE project. These initial components will be added to with laughter data specifically collected according to the needs of the project. This will include full body motion capture data with accompanying audiovisual data and face only motion capture with accompanying audiovisual data. The goal is to collect a broad variety of types of laughter within the broad categories of social and hilarious and more refined categories outlined in Table 1. As this data is collected and annotated it will become part of the ILHAIRE database and be made available to the research community.

9. Availability

We plan to make the database available for use by the broader research community in the near future.

10. References

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